CLAIMS

1. A volumetric method of consistent metering and filling of doses of finely divided dry powder medicaments into containers, **characterized by** the steps of

forming a filling tool to include at least one powder receptacle having a first opening and a second opening, the receptacle having a volume corresponding to a chosen load mass of a selected medicament powder, the load representing at least a part-dose and preferably representing a dose;

applying a stretched woven filter between the second opening of the receptacle and a suction nozzle, using flexible seals at joints to stop air and powder leakage, whereby distortion and variation of the receptacle volume is prevented during a filling operation and where the woven filter eliminates a risk of loose filter fibers getting mixed with the powder load;

filling the at least one receptacle with the selected medicament powder from a storage chamber using suction power through the woven filter, whereby a powder load of known mass is formed by the assistance of the woven filter;

moving the filling tool to a new position such that the at least one receptacle, now filled with a powder load, is brought in a downward facing, emptying position;

applying air pressure to the second opening of the receptacle such that the load is ejected and directed towards a container positioned beneath the receptacle, whereby at least a part-dose or preferably the dose is formed in the container; and

repeating the steps of filling the receptacle, moving the filling tool and applying air pressure, whereby doses are produced in a multitude of containers, the doses having a relative dose-to-dose standard deviation below 10 % and preferably below 5 %.

2. The method according to claim 1, **characterized by** the further step of

re-enforcing the mechanical strength of the woven filter by arranging a supporting wire netting at one or optionally both sides of the woven filter.

3. The method according to claim 1, **characterized by** the further step of

selecting a filling tool material providing selected properties regarding stability of form, machining, resistance to abrasion and low friction in a group of materials comprising stainless steel, metals, alloys and glass.

4. The method according to claim 1, **characterized by** the further step of

applying a hard-wearing, low-friction coating onto at least surfaces of the receptacles in the filling tool, optionally on other surfaces of the same, thereby reducing the dynamic friction and powder retention susceptibility of exposed surfaces and making cleaning easier.

5. The method according to claim 1, **characterized by** the further step of

applying a spring force to keep contact pressure constant between an air nozzle, the filter and the second opening of the respective receptacle, such that elastic seals sealing nozzle, filter and receptacle will stop leakage of air and powder into and out of the receptacle.

6. The method according to claim 1, **characterized by** the further step of

making the shape of the at least one receptacle of the filling tool to an elliptic form in order to adapt the physical form of the powder load to

fit a pre-defined elongated form of a container, which will receive the load upon unloading from the receptacle.

7. The method according to claim 1, **characterized by** the further step of

arranging a source of electric charges, preferably an ion source, in an air gap between the filling tool and the container(s) such that electrically charged particles in ejected powder loads become electrically neutralized while being transferred through the air.

8. The method according to claim 1, **characterized by** the further step of

arranging sources of electric charges, preferably ion sources, at a working distance to the filling tool and optionally at a working distance to the powder in a storage chamber in order to accomplish that electrostatic charges on the tool and associated equipment and powder particles in the storage become electrically neutralized such that the filling process is not adversely affected.

9. The method according to claim 1, **characterized by** the further step of

reducing the height of a deposited powder load in a destination container by subjecting the load, or the container and load, to an energy source, which may be ultrasonic, vibrating, shocking or electrical in nature, such that the load is spread out inside the container and cannot interfere with a cover, preferably a sealing foil, in an ensuing sealing procedure.

10. The method according to claim 1, **characterized by** the further step of

reducing the height of a deposited powder load in a destination container by subjecting the load, or the container and load, to a doctor blade such that the load is spread out inside the container and cannot interfere with a cover, preferably a sealing foil, in an ensuing sealing procedure.

11. The method according to claim 1, **characterized by** the further step of

choosing the load mass of the selected medicament powder to be in a range 100 µg - 50 mg and preferably in a range 100 µg - 10 mg and most preferably in a range 100 µg - 5 mg.

12. A filling tool device for consistent, precise, repeatable metering and filling of doses of finely divided dry powder medicaments into containers, **characterized in** that

the filling tool is arranged to comprise at least one powder receptacle having a first and a second opening, the receptacle being of a volume corresponding to a chosen load mass of a selected medicament powder, the load representing at least a part-dose or preferably representing a dose;

a stretched, form-stable, woven filter is applied between the second opening of the receptacle and a suction nozzle, and flexible seals are being used at joints to stop air and powder leakage, the woven filter preventing distortion and variation of the receptacle volume during a filling operation and eliminating a risk of loose filter fibers getting mixed with the powder load;

the at least one receptacle is filled with the selected powder from a storage chamber by suction power through the woven filter, whereby a consistent powder load mass is formed by the assistance of the form-stable, woven filter;

the filling tool is moved to an emptying position and air pressure of sufficient power is applied to the second opening of the receptacle such that the load may be ejected in a direction towards a container positioned beneath the receptacle, whereby at least a part-dose and preferably the dose is deposited into the container, and

the steps of filling the receptacle, moving the filling tool and applying air pressure are repeated, whereby doses are deposited in a multitude of containers, the doses having a relative dose-to-dose standard deviation below 10 % and preferably below 5 %.

13. The filling tool device according to claim 12, **characterized in** that

the mechanical strength of the woven filter is re-enforced by arranging a supporting wire netting at one or optionally both sides of the woven filter.

14. The filling tool device according to claim 12, **characterized in** that

a filling tool material is selected providing appropriate properties regarding stability of form, machining, resistance to abrasion and low friction from a group of materials comprising stainless steel, metals, alloys and glass.

15. The filling tool device according to claim 12, **characterized in** that

a hard-wearing, low-friction coating is applied to at least surfaces of the receptacles in the filling tool, optionally to other surfaces of the same, thereby reducing the dynamic friction and powder retention susceptibility of exposed surfaces and making cleaning easier.

16. The filling tool device according to claim 12, **characterized in** that

a spring force is applied to keep contact pressure constant between an air nozzle, the filter and the second opening of the respective receptacle, such that elastic seals sealing nozzle, filter and receptacle will stop leakage of air and powder into and out of the receptacle.

17. The filling tool device according to claim 12, **characterized in** that

the shape of the at least one receptacle of the filling tool is made to an elliptic form in order to adapt the physical form of the powder load to fit a pre-defined elongated form of a container, which will receive the load upon unloading from the receptacle.

18. The filling tool device according to claim 12, **characterized in** that

a source of electric charges, preferably an ion source, is arranged in an air gap between the filling tool and the container(s) such that electrically charged particles in ejected powder loads become electrically neutralized while being transferred through the air.

19. The filling tool device according to claim 12, **characterized in** that

sources of electric charges, preferably ion sources, are arranged at a working distance to the filling tool and optionally at a working distance to the powder in a storage chamber in order to accomplish that electrostatic charges on the tool and associated equipment and powder particles in the

storage become electrically neutralized such that the filling process is not adversely affected.

20. The filling tool device according to claim 12, **characterized in** that

the height of a deposited powder load in a destination container is reduced by subjecting the load, or the container and load, to an energy source, which may be ultrasonic, vibrating, shocking or electrical in nature, such that the load is spread out inside the container and cannot interfere with a cover, preferably a sealing foil, in an ensuing sealing procedure.

21. The filling tool device according to claim 12, **characterized in** that

the height of a deposited powder load in a destination container is reduced by subjecting the load, or the container and load, to a doctor blade such that the load is spread out inside the container and cannot interfere with a cover, preferably a sealing foil, in an ensuing sealing procedure.

22. The filling tool device according to claim 12, **characterized in** that

the load mass of the selected medicament powder is chosen to be in a range 100 µg - 50 mg and preferably in a range 100 µg - 10 mg and most preferably in a range 100 µg - 5 mg.

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